



Solar Hybrid Hot Tub

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TOOLS:

- [Caulking gun \(1\)](#)
- [Drill \(1\)](#)
- [Paintbrush \(1\)](#)
- [Saw \(1\)](#)
- [Screwdriver \(1\)](#)
- [Utility knife \(1\)](#)



PARTS:

- [Plywood \(2\)](#)
- [Plexiglass \(2\)](#)
- [Vinyl hose \(3\)](#)
- [Wood \(Scrap\)](#)
[I used some 2x2 lumber ends.](#)
- [Paint \(1\)](#)
- [Pump \(1\)](#)
[I used a 12V DC marine pump; a \\$20 fountain pump that runs off AC would also work. The less water the pump moves, the hotter it heats, so no need for a monster.](#)
- [Solar panel \(1\)](#)
[to run the pump; I got mine from eBay.](#)
- [Hose barb \(2\)](#)
[to connect the pump to the vinyl hose. May vary depending on your pump.](#)
- [Male-to-male hose barb \(3\)](#)
[to join vinyl hose, plus extras for repairs](#)
- [Wood screws \(24\)](#)

- [Wood screws \(48\)](#)
- [Carpenter's glue \(1\)](#)
- [Caulk \(1\)](#)

SUMMARY

Back when I lived in California, I heated the water for my house and hot tub using some 1970s “energy crunch”-era solar thermal collectors that I found at a junkyard. They were a nice design from Israel, with a large plexiglass collection surface and an insulated horizontal tank with its outlet up top, where the hottest water rises.

Those restored units were all the water heating we needed for about 9 months of the year, and I installed them on a hillside rather than the roof for easier maintenance. (Alternative energy means lots of repairs; if you're harvesting energy from the environment, your equipment will be, well, out in the environment.)

Then I moved to a newer house in Seattle with a fancy automatic hot tub on the rooftop deck. But I was appalled when I saw that it cost up to \$40 in electricity each month to heat this mass of water and leave it covered outside overnight.

So I came up with this simple and inexpensive solar system that adds heat to the hot tub during the day so that the main electric heater doesn't have to work as hard after the sun goes down.

Step 1 — Solar collectors.



- The system heats the water by running it through coils of black vinyl hose inside 2 solar collector boxes. A small solar-powered pump draws water out of the tub, runs it through the coils, then dumps it back in. The tub's original heater and thermostat are not altered, but the heater switches on less.
- For the solar collectors, I built 2 open 3'x3' boxes out of plywood reinforced with blocks of scrap wood in the corners (I had just 1 box originally, but expanded the system later). I put the boxes together using 1 1/4" wood screws and glue, then caulked the cracks and painted them matte black inside and out. For the vinyl hose inlet and outlet, I drilled a hole in the side of each box near the bottom.
- I tucked the pump under one side of the hot tub, and used hose barb fittings to connect each end to black vinyl hose. Then I connected the rest of the hose together, coiled it inside both boxes, and dropped each end into the tub, separated slightly. The pump sits on the inlet side of the hose, but I don't think it matters..
- I fitted plexiglass tops onto the boxes with 3/4" screws, washers, and more caulk, and tilted the boxes up on the deck across from the hot tub, to lean south for more sunlight.
- The vinyl hose is inexpensive and easy to repair in case of freezes: just cut out the broken part and insert a barbed connector.
- TIP: Dipping the hose into very hot water for 15 seconds makes it easier to slip a fitting inside.



Step 2 — Power pump.



- My original system had just 1 collector and used an aquarium pump on a 1-hour timer. But the pump ran even on cloudy days, when it drew hot water out of the tub to get cooled — which was not the idea.
- I thought of adding a light-sensitive switch to prevent this, but instead chose to power a new DC pump with a solar panel. The pump sits under the tub and only runs in bright sunlight, when the boxes heat the water most efficiently.

Step 3 — Results.

- This system doesn't provide the same level of heating as my old setup in California. Its surface area is smaller, and with less sun and colder temperatures, the Seattle weather doesn't help. As my old California neighbor Steve said, "Here, you can just throw hose on the ground."
- But on sunny days, the days when your parked car is hotter than the outside air when you get in, it works great. The water returns to the tub 2° or 3° hotter than when it left, which may not sound like much, but it adds up.
- The entire system cost me about \$70 for parts and materials, and it will keep paying back as fuel prices rise. In warmer, sunnier climates, systems like this can actually overheat your tub. Unlikely in Seattle, but I did get my hot tub too hot once or twice in California. It cools off pretty quickly with the top off. As my physicist friend Heyward once said, "Heating water is not rocket science."

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